

REMARKS

Before entry of this Amendment, claims 1-32 were pending in the application. After entry of this Amendment claims 1-32 remain pending under examination. The number of total claims has not been increased, and the number of independent claims has not been increased beyond the number for which payment previously had been made.

Applicants have carefully considered the Examiner's Action of July 14, 2003, and the references cited therein. The following is a brief summary of the Action.

Claims 1-6 and 10-20 were rejected under 35 U.S.C. 103(a) as unpatentable over Billion (U.S. Patent No. 4,723, 659) in view of Billion (U.S. Patent No. 4,634,881). Claims 7-9 and 21-32 were rejected under 35 U.S.C. 103(a) as being unpatentable over Billion in view of Billion and further in view of Lockett (U.S. Patent No. 4,260,062).

Applicants have corrected a typographical error in the specification without adding any new matter.

Applicants respectfully traverse the rejections of claims 1-6 and 10-20 under 35 U.S.C. § 103(a) over Billion'659 in view of Billion'881 for the reasons explained below.

The device disclosed in the Billion'659 patent includes only two types of detectors, and neither one satisfies the requirements of the claimed invention. A first detector 20 in the Billion'659 patent has a field of view that is larger than the cross-sectional area of the light beam and receives only the light reflected from the background element and from the translucent bodies moving through the light beam. Referring to Fig. 4, as explained at column 4, lines 34-38 of Billion'659, "[a]ccording to the invention, the optical centerpoint of the photosensitive detector [20] has been made

blind by means of a small black spot 37 so that the light spot 30 or 34 caused by diffuse reflection, has no influence on the output signal of the photosensitive detector [20].”

Thus, the first detector 20 is made insensitive to light in the part of its field of view that corresponds with the point of impingement of the light beam on the translucent bodies.

This first detector 20 in the Billion'659 patent therefore is not sensitive to substantially all of the direct and diffused reflected light from the products. Nor can this first detector 20 in the Billion'659 patent generate a signal corresponding to substantially all of the direct and diffused reflected light from the products.

Referring to Figs. 4-6, as explained at column 5, lines 9-26 of Billion'659, there is an embodiment with a first detector 55 and a second detector 56. As shown in Figs. 5 and 6 and explained at column 5, lines 9-17, the Billion'659 device uses a mirror 51 having a small hole 54 defined therethrough that corresponds to the point of impingement of the laser beam on the translucent bodies. Only the reflected light from the point of impingement passes through the small hole 54 in the mirror 51 and reaches the first detector 55. Thus, it is this mirror 51 that prevents the first detector 55 from receiving reflected light directly from the products. This first detector 55 in the Billion'659 patent therefore is not sensitive to substantially all of the direct and diffused reflected light from the products. Nor can this first detector 55 in the Billion'659 patent generate a signal corresponding to substantially all of the direct and diffused reflected light from the products.

Moreover, referring to Figs. 4-6, as explained at column 5, lines 20-26 of Billion'659, the hole 54 in this mirror 51 prevents the second detector 56 from receiving reflected light from the point of impingement of the laser beam on the translucent

bodies. Thus, the reflected light from the point of impingement passes through the small hole 54 in the mirror 51 and is not reflected to the second detector 56. Only the reflected light from the product surrounding the point of impingement is reflected by the mirror 51 and reaches the second detector 56. Accordingly, this second detector 56 in the Billion'659 patent is not sensitive to substantially all of the direct and diffused reflected light from the products. Nor can this second detector 56 in the Billion'659 patent generate a signal corresponding to substantially all of the direct and diffused reflected light from the products.

The detectors 24, 24' disclosed in the Billion'881 patent cannot correct the noted deficiency in the Billion'659 patent because detectors 24, 24' are configured and disposed like the detectors 55, 56 that are described in the Billion'659 patent. Thus, neither of these detectors 24, 24' in the Billion'881 patent is sensitive to substantially all of the direct and diffused reflected light from the products. Nor can either of these detectors 24, 24' in the Billion'881 patent generate a signal corresponding to substantially all of the direct and diffused reflected light from the products.

Unlike any of the detectors disclosed in the Billion'659 patent or in the Billion'881 patent, each of claims 1-20 requires a single detector, namely, the first detector, that is sensitive to substantially all of the direct and diffused reflected light from the products and generates a first signal corresponding to substantially all of the direct and diffused reflected light from the products. Thus, in the invention described by each of claims 1-20, a single detector is configured and disposed to do more work than any single detector disclosed in the Billion'659 patent and the Billion'881 patent is configured and disposed to accomplish. Indeed, the device disclosed in one embodiment of the

Billion'659 patent requires two detectors 55 and 56 to detect substantially all of the direct and diffused reflected light from the products, while only one detector is required for the same task in the invention described by each of claims 1-20.

Moreover, even these two detectors 55, 56 (Billion'659) or 24, 24' (Billion'881) disclosed in the prior references fail to gather substantially all of the light signal that is reflected from the field of view. This deficiency in the prior art arises due to the edge effects at the hole 54 in the mirror 51 (Billion'659, e.g.). Part of the light that is directed to the mirror 51 becomes distorted at the edge that defines the hole 54 in the mirror 51. Thus, even if the two signals (the one passing through the hole 54 to detector 55 and the other reflected from the mirror 51 to detector 56) in Billion'659 are later combined (though there is no suggestion to do so), this sum of the two signals differs from the original light signal that was directed to the mirror 51 before suffering degradation due to the distortion occurring at the edge that defines the hole 54 in the mirror 51.

Additionally, because a single detector is configured and disposed in the invention described by each of claims 1-20, to do more work than any single detector disclosed in the Billion'659 patent and the Billion'881 patent is configured and disposed to accomplish, the invention described by each of claims 1-20 provides more information than is provided by the devices disclosed in the Billion'659 patent and the Billion'881 patent.

In view of these significant advantages of the configuration that is described by each of claims 1-20 of the present invention, Applicants respectfully submit that this claimed invention was not obvious to the person of ordinary skill in view of what is disclosed in the Billion'659 patent and the Billion'881 patent.

Regarding claim 4 in particular, the Action contends that since the abstract of Billion'659 discloses detecting a change of the output signals, it would have been obvious that Billion'659 would have to have a difference device in order to detect the change of the output signal. However, detection of a change does not of necessity require a difference device as is assumed by the Action. The simplest demonstration is provided by Billion'659 itself, which admittedly does not disclose a difference device, and yet detects a change by the use of an addition device. Accordingly, since the rejection is based upon an inference that is illogical, claim 4 therefore is patentable over Billion'659 in view of Billion'881 for this additional reason.

Regarding claims 5, 6 and 19 in particular, the Action refers to a small hole located in front of the camera (column 3, lines 1-5) as disclosed in Billion'659 to perform the same function as the claimed diaphragm. However, there is no mention of a camera in this or any other portion of Billion'659. Moreover, in Billion'659, it is a mirror 51 that contains a small hole 54 at the center. This hole 54 in the mirror 51 does not perform the same function as the diaphragm cited in claims 5, 6 and 19. The mirror 51 of Billion'659 performs a beam-splitting function rather than a focusing function as is performed by the diaphragm 80 (Fig. 3) of claims 5, 6 and 19. The beam-splitting function in claims 5, 6 and 19 can be performed by the polarizing beam splitter, and the diaphragm is an additional element that is absent in Billion'659. Additionally, each of claims 5, 6 and 19 requires a separate defining member for disposal in front of each of the two detectors. Billion'659 discloses only a single mirror 51 with a hole 54. Accordingly, each of claims 5, 6 and 19 is patentable over what is disclosed in Billion'659 in view of the disclosure of Billion'881 for these additional reasons.

Regarding claims 15-18 and 20, the Action contends that Billion'659 could be modified to add additional sorting control signals based on color of the products without departing from routine skill in the art. However, there is no showing of how to use the information collected by the detectors of Billion'659 to provide additional sorting control signals that would enable determinations of color to be discriminated and used as the basis for selecting different colored products from the product stream. Recall from the discussion above that Billion'659 and Billion'881 fail to gather all of the available information from the reflected light. Moreover, the absence of any reference deprives applicants of demonstrating the incompatibility of the cited reference with the Billion'659 disclosure. This deficiency unfairly handicaps applicants in demonstrating that indeed the invention described in these claims would not have been obvious to the person of ordinary skill in view of this mystery reference. Here, there is an unfair reliance on unidentified "general conditions of the invention [that] are disclosed by the prior art." This does not satisfy the requirement of 35 U.S.C. § 132 to provide "such information and references as may be useful in judging of the propriety of continuing prosecution of his application."

Regarding claim 12, the Action relies on the disclosure of multiple lights in the abstract of Billion'881. However, claim 12 requires two laser beam generators and a concentrated light beam that is a combination of two laser beams of different wave lengths. None of this information is suggested or disclosed in the abstract of Billion'881. Accordingly, in the face of this deficiency, claim 12 is patentable for this additional reason.

Applicants therefore respectfully submit that claims 1-6 and 10-20 are patentable under 35 U.S.C. § 103(a) over Billion '659 in view of Billion '881.

Applicants respectfully traverse the rejections of claims 7-9 and 21-32 under 35 U.S.C. § 103(a) over Billion'659 in view of Billion'881 and further in view of Lockett for the reasons explained below.

Lockett discloses an altogether different type of device than either of the devices disclosed in Billion'659 and Billion'881. And thus the person of ordinary skill would not look to the Lockett device to solve any deficiencies in the devices of Billion'659 and Billion'881. In the Lockett device, a detector receives reflections from a diffuse light source and dynamically generates a signal indicative of one type of information. This information is compared to a database of stored reference signals that are indicative of the same type of information, and conclusions are drawn from the result of this comparison between a dynamic signal and a number in a table. In the devices of Billion'659 and Billion'881, there is a concentrated light source such as a laser rather than a diffuse light source. Moreover, two different detectors in the devices of Billion'659 and Billion'881 receive different parts of light reflected off articles from the concentrated light source. The two dynamically detected signals of Billion'659 and Billion'881, each signal containing non-overlapping information, are compared to one another to provide information that leads to the desired conclusion.

In particular, Lockett is cited as disclosing (column 10, lines 15-30) a beam splitter in front of first and second sensors. However, in this cited portion (column 10, lines 15-30) of Lockett, it is clear that the beam splitter deprives any one sensor from receiving the complete reflected signal containing substantially all of the direct and

diffused reflected light from the products. Thus, Lockett does not rectify the deficiencies noted above with respect to the base references Billion'659 and Billion'881 concerning the absence of a single detector that is sensitive to substantially all of the direct and diffused reflected light from the products and that generates a signal corresponding to substantially all of the direct and diffused reflected light from the products. Accordingly, claims 7-9 are allowable for essentially the reasons set forth above with respect to claims 1 and 14.

Regarding claims 8 and 9 in particular, the Action admits that Lockett fails to disclose a polarizing beam splitter. While the Action contends that such a device would have been known in the art, the Action fails to cite to any reference that points to substitution of a polarizing beam splitter in the Lockett device to make the Billion'659 system more accurate. Apparently, the only justification for his substitution is the hindsight learned from the present specification, and of course this is an improper reliance for demonstrating obviousness of the claims at issue. Accordingly, claims 8 and 9 are patentable over the asserted combination of references for this additional reason.

Claim 21 is allowable for essentially the reasons set forth above with respect to claims 1 and 14. For claim 21 similarly requires "receiving one of the reflected beams with a first detection device that is sensitive to substantially all of the reflected light from the products and generating a first signal proportional thereto". As noted above, each of the references suffers from failing to disclose or suggest a single detector that is sensitive to substantially all of the direct and diffused reflected light from the products

and that generates a signal corresponding to substantially all of the direct and diffused reflected light from the products.

Additionally, claim 21 requires "controlling a removal device to remove unwanted objects or irregularities from the mass of moving products with either of the first and second signals individually or a difference between the first and second signals". The devices of Billion'659 and Billion'881 do not control a removal device based on a difference between the first and second detected signals. Nor is this additional deficiency in the devices of Billion'659 and Billion'881 capable of being corrected by what is disclosed in Lockett. The device of Lockett only detects one signal and compares it to a range of representative values stored in a database, not to a second signal that also was detected.

Regarding claim 22 in particular, the Action relies on the same reasons as for the rejection of claim 4, which contends that since the abstract of Billion'659 discloses detecting a change of the output signals, it would have been obvious that Billion'659 would have to have a difference device in order to detect the change of the output signal. However, detection of a change does not of necessity require a difference device as is assumed by the Action. The simplest demonstration of this fact is provided by Billion'659 itself, which admittedly does not disclose a difference device, and yet detects a change by the use of an addition device. Accordingly, since the rejection is based upon an inference that is illogical, claim 22 therefore is patentable over Billion'659 in view of Billion'881 and further in view of Lockett for this additional reason.

Regarding claims 23 and 24 in particular, the Action relies on the same reasons as for the rejection of claims 15-18. Thus, the rejection of claims 23 and 24 suffer from

the same deficiencies as noted above regarding the rejection of claims 15-18.

Accordingly, claims 23 and 24 therefore are patentable over Billion'659 in view of Billion'881 and further in view of Lockett for this additional reason.

Regarding claims 25 and 26 in particular, the Action relies on the same reasons as for the rejection of claims 8 and 9. Thus, the rejection of claims 25 and 26 suffer from the same deficiencies as noted above regarding the rejection of claims 8 and 9. Accordingly, claims 25 and 26 therefore are patentable over Billion'659 in view of Billion'881 and further in view of Lockett for this additional reason.

As to claim 30 in particular, which requires an additional concentrated light beam across the path of the moving product on an opposite side from the first light beam, the Action fails to address this deficiency in the cited references.

Regarding claim 32 in particular, the Action relies on the same reasons as for the rejection of claim 15. Thus, the rejection of claim 32 suffers from the same deficiencies as noted above regarding the rejection of claim 15. Accordingly, claim 32 therefore is patentable over Billion'659 in view of Billion'881 and further in view of Lockett for this additional reason.

Applicants therefore respectfully submit that claims 7-9 and 21-32 are patentable under 35 U.S.C. § 103(a) over Billion'659 in view of Billion'881 and further in view of Lockett.

Applicants respectfully request reconsideration and reexamination of claims 1-32, as presented herein, and submit that these claims are in condition for allowance and should be passed to issue.

If any fee or extension of time is required to obtain entry of this Amendment, the undersigned hereby petitions the Commissioner to grant any necessary time extension and authorizes charging Deposit Account No. 04-1403 for any such fee not submitted herewith.

Respectfully submitted,

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